

Projections of Remedy Effectiveness Using the Working LPR/NB Model

November 14, 2013
EPA/CPG Meeting

Outline

- Sediment COPC concentrations at the start of projections
- Assumptions about hydrodynamics and sediment transport
- Assumptions about boundary conditions
- Method for simulating active remediation
- Design of the targeted remedy
- Ongoing efforts

Relationship of CPG to EPA Model on Projection Simulations

Modeling Approach	EPA	CPG
Sediment 2378-TCDD Concentration at Start		
Initial Condition	~√	~√
Assumption about Hydrodynamics and Sediment Transport (HST)		
Hydrograph	√	√
Initial Bathymetry	√	√
Post-dredge Bathymetry	√	X
HST Implementation	~√	~√
Assumption about Boundary Conditions		
Solids Loads	√	√
2378-TCDD Loads	√	√
Method for Simulating Active Remediation		
Residual	√	√
Solids Release	√	X
2378-TCDD Release	√	√
Dredge schedule	~√	~√

Sediment 2378-TCDD Concentrations at the Start of Projections

- EPA → used predictions of 2010 conditions derived from model run from 1995 to 2010
 - 1995 initial condition set with EPA mapping/dataset
 - EPA LPR Dataset includes select 1990 to 2011 data
- CPG → used predictions of 2012 conditions derived from model run from 2010 to 2012
 - 2010 initial condition set with CPG mapping/dataset
 - CPG LPR dataset includes 2007 to 2012 data for surface; 1991 to 2012 data for subsurface
- Both EPA and CPG impose vertical gradients for continuous concentration profiles, but with different approaches

Assumptions about Hydrodynamic and Sediment Transport (HST)

- Future hydrological conditions are similar to the calibration period between WY 1996 and 2010 → both EPA and CPG loop this hydrograph
- EPA → Continuous HST run for 45-year projection (?)
- CPG → Continuous HST run for the first 15 years of projection and cycled 2 times for the remaining 30 years
 - Based on 50-ft post-dredge bathymetry in NB/Kills
 - Maintenance dredging implicitly reflected through the cycling of HST results
 - No adjustment of bed elevation due to dredging

Assumptions about Boundary Conditions

- Boundary conditions are tied to the hydrological assumptions
- ST Model
 - Repeated solids loads from WY 1996-2010 for each of three 15-year projection cycles
- CFT Model
 - Used 2378-TCDD input files received from EPA in April 2012
 - Concentration continuously declined from the end of WY 2010 for Kill Van Kull and Arthur Kill (based on regional CARP output)
 - Repeated WY 1996-2010 values for tributaries (based on HQI loading functions)
 - Also repeated point source loads, non-point source loads, and atmospheric loads from WY 1996-2010

Simulation of Active Remediation

Remedial Alternatives

- Evaluated a number of alternatives, including
 - Monitored Natural Recovery (MNR)
 - Targeted Remedy (TR)
 - EPA FFS Dredge/Cap with realistic schedule (D/C)
 - EPA FFS Full Dredge with realistic schedule (FD)
- All alternatives included removal of RM 10.9 and Tierra Phase 2 areas
 - Remediated Tierra Phase 1 area prior to the projection
- Remedial footprint/dredge volume for Dredge/Cap based on the dredge input from EPA (April 2012)
- Dredge volume for Full Dredge were estimated based on available information
 - Total dredged volume was similar to EPA's full dredge

Simulation of Active Remediation

Dredge Schedule and Sequence

- Remediation started in July 2013
- Based on realistic dredge rate
 - Overall production rate = 240,000 cy/year
 - No dredging during winter and fish window
 - Capping time not included
- Dredged from upstream to downstream
 - Except RM 10.9 area was removed first in July 2013

Alternatives	EPA	CPG
Targeted Remedy	---	3.3 years
Dredge/Cap	4.7 years	14.4 years
Full Dredge	10.7 years	42.0 years

Simulation of Active Remediation

Remediation Code

- HST model code documented in January 2013 memo to EPA
 - Solids release was not included in projections
- CFT model code received in April 2012
 - Corrected a code error with EPA/HQI in February 2013
 - Slightly modified code to simulate targeted remedy in April 2013 (details to follow)
 - Other CFT modifications as previously noted (simplified fluff treatment, spatially variable mixing, gross carbon flux)

Simulation of Active Remediation

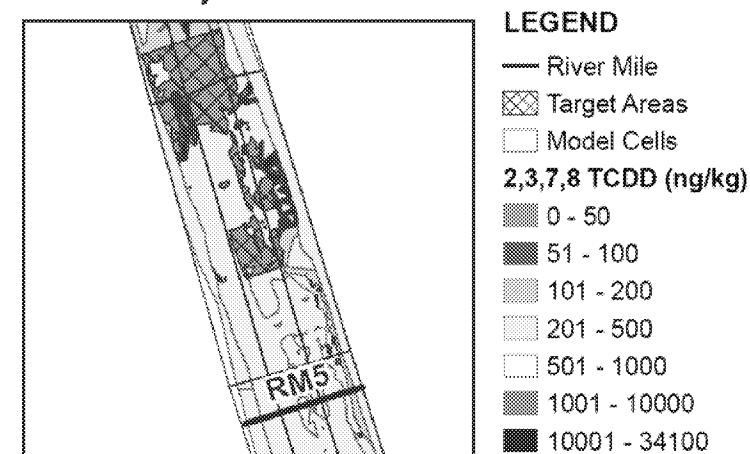
Remediation Settings

- Remedial settings
 - Cap material has the same bed properties as native sediments
 - Residual concentration = 0
 - Release 3% of dredged 2378-TCDD mass to water column
 - Estimated 2378-TCDD concentration below 5.5 ft based on CPG mapping

Simulation of Active Remediation

Implementation of Targeted Remedy

- Identified areas with surface 2378-TCDD > 500 ppt
 - Based on the CPG mapped 2010 surface
 - Dredged 2 feet of sediment and capped to grade
- Simulated partial-cell remediation for targeted remedy → required minor code change
 - Specified a dredge ratio for each cell based on the post-remedial concentration reduction in the surface layer
 - Adjusted residual concentrations for all bed layers
 - Adjusted dredge mass for release



Refinement of Projections

Ongoing Efforts

- Ongoing HST/CFT model development, as previously noted
- Review and refine projection inputs and approaches
 - Consider continuous HST vs. looped HST
 - Consider updating to post-dredge bathymetry
 - Include solids release for dredged material
 - Update dredge/cap and full dredge alternatives to use more recent EPA remediation files (received March 2013)
- Review boundary conditions approach using CWCM data
- Review model settings for COPCs other than 2378-TCDD
- Develop targeted remedy based on updated COPC mapping